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Before the
Federal Communications Commission
Washington, D.C. 20554

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ORIGINAL

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In the Matter of)

Inquiry into Encryption Technology)
for Satellite Cable Programming)

PP Docket No. 92-234 ✓

REPORT

Adopted: April 1, 1993

Released: April 29, 1993

By the Commission: Commissioner Marshall not participating.

I. Introduction

1. The Commission initiated this examination of encryption technology for satellite cable programming in response to a request from members of Congress to "(1) review efforts to develop at least one additional source of video descrambling modules compatible with de facto industry standards for use of the C-band, and (2) review the feasibility of ensuring that all legal and compatible descrambling modules be eligible for authorization through the Direct Broadcast Satellite (DBS) Authorization Center."¹ The Commission also took the opportunity of this inquiry to address related technological issues, such as the feasibility and utility of a standard decoder interface that would permit a single integrated receiver descrambler or IRD (a satellite receiver with a built-in decoder) to function with multiple encryption systems and the implications of the apparent trend toward digital transmission of video, whether for advanced television (ATV) or compressed

¹ Letter of Edward J. Markey and C. Thomas McMillen, Members of Congress, to the Honorable Alfred Sikes, Chairman, Federal Communications Commission. July 6, 1992. See also Letters of the Honorable Alfred C. Sikes to the Honorable Edward J. Markey, Chairman, Subcommittee on Telecommunications and Finance, Committee on Energy and Commerce, House of Representatives and to the Honorable C. Thomas McMillen, U.S. House of Representatives. July 31, 1992.

standard television signals, and their impact on encryption technology.²

2. The Commission's Notice in this proceeding provides background information on the home satellite dish (HSD) industry.³ We shall not repeat that history here. However, we do note that, as we opened our inquiry, there was one firm, Titan Satellite Systems, Inc., proposing to provide a competitive source of modules "compatible with de facto industry standards for use of the C-band." That de facto standard is the Videocipher II (VC II)

~~technology for this Conceptual Testimony Generation (CTG) and patents~~ 4

important than intra-system competition.⁶ With regard to DBS Center access, commenters (including Titan) generally did not support mandatory access, for reasons that ranged from the asserted low cost of building alternative access centers to the judgment that it does not make good business sense to utilize a facility owned by a rival to implement one's own conditional access system.

4. Commenters generally agree that the change from analog to digital transmissions will be gradual and that, during the transition, it is likely that "hybrid" digital/analog decoders would be available. Many commenters endorse the concept of a standard decoder interface, but most oppose government action to mandate it. Commenters generally believe that it is useful for the Commission to monitor and focus attention on encryption technology and compatibility issues, but that no Commission action is warranted at this time.

II. Competition in Decoder Module Supply

5. Commenters are uniformly in favor of competition, all other things being equal, citing benefits of reduced costs and incentives to innovate.⁷ With regard to intra-VC II competition, some commenters raised questions about possible increased vulnerability to theft of services and increased difficulties of dealing with a security breach in a regime of compatible but different systems.⁸ A few commenters addressed the current state of

6. Intrasystem competition. In addition to the standard competitive benefits of lower price and increased innovation, a few commenters also

of programmers signal, something required by the Titan system.¹⁴ Titan also claims that GIC has falsely claimed that certain interfacing of GIC and Titan equipment at programmers' uplink sites would violate programmers' software license with GIC. Titan asserts that its system is secure and cost-effective and could, with limited effort and cooperation from GIC and programmers, operate side-by-side with the GIC system.

9. In turn, GIC asserts that Titan "should have the burden of demonstrating the feasibility of incorporating its system into the existing encryption and access control system used by the HSD market, particularly with respect to security requirements" and goes on to claim that Titan has failed to do so.¹⁵ In addition to raising broad questions about the security of Titan's system and its hardware¹⁶, GIC also expresses concern regarding Titan's proposal to place a piece of its equipment, the Message Processor Unit, in between two pieces of GIC equipment at programmers' uplink sites. GIC suggests that this poses a security risk and a threat to the smooth functioning of the system, which GIC is obligated to maintain.¹⁷ GIC also notes that the Titan system depends on the same basic program keys to decode the signal as the GIC system does. GIC suggests that, in response to a security break, it might want or need to change the way that those keys are processed.¹⁸ This could end up disabling not only pirate decoders but legitimate Titan decoders too. Thus, suggests GIC, coexistence with the Titan system could limit its ability to respond to security problems. GIC also suggests that a comparison of its wholesale decoder module price (\$336) with Titan's proposed price (\$249) is not meaningful because the ancillary services, such as continuing activities to maintain security, are not

¹⁴ The Titan claims described in this paragraph are found in Titan Comments at 16-34.

¹⁵ GIC Reply at 3. GIC denies that its phaseout of the HBI is anticompetitive, asserting that it "represents a first step to upgrade programmers' uplink scramblers to ensure that pirated Videocipher II units are disabled and the old hardware cannot be reused." Id., at 6. We cannot resolve this question. However, we agree with CSS that the HBI is not inherently a less secure portion of the signal than the vertical blanking interval (VBI), where the Videocipher Plus Renewable Security authorization datastream is located. See CSS Reply at 8-9.

¹⁶ Id., at 3-11.

¹⁷ Id., at 7-8.

¹⁸ Id., at 5-6.

specified for the Titan system.¹⁹

10. The two encryption systems are both technically very complex and neither Titan nor GIC provided proprietary details for the record in this proceeding. For that reason, the Commission is unable to evaluate all of the assertions made regarding the two systems. However, based on the record before us, we cannot dismiss as unfounded the reservations of GIC and HBO with regard to the difficulties of coexistence between the GIC and Titan systems. In particular, GIC's concerns about guaranteeing the integrity and smooth functioning of its system when a Titan product is inserted into the chain of GIC equipment at uplink sites, and GIC's concern that its ability to respond to a security break would be constrained by the necessity to coordinate with the Titan system appear genuine. We do not pass judgment on the validity of these concerns, but we do not see them as strictly motivated by anticompetitive impulses either.

11. Recently Titan announced that it was suspending its efforts to enter the consumer decoder market.²⁰ Titan suggested that the primary reason for this was the failure of any programmers to agree to use its system to authorize customers. Titan has not ruled out a re-entry at a later date.

12. Channel Master as a Second Source. GIC also asserts, supported by Netlink, that intrasystem competition currently exists by virtue of Channel

¹⁹ GIC Comments at 12-15. As the decoder module moves through the distribution chain from manufacturer to wholesaler to retailer to consumer, its price is marked up. Titan applies certain markup assumptions to assert that the implicit retail price of the GIC module is \$717.95. Titan Comments at 12. GIC contests this calculation, asserting that its new "open distribution" policy has "significantly broadened availability of outlets of decoders." GIC Reply at 9. Now distributors and other entities such as programmers and program packagers can purchase modules directly and sell them directly to retailers or consumers. As a consequence, markups may be reduced. GIC cites several recent advertisements in which program distributors offered consumers a decoder module and a programming subscription as a package deal. By subtracting out the programmers' advertised price for the programming alone, GIC calculated the implicit price for the decoder module in these offers. They range from \$241-\$359. See GIC Reply, Appendix A.

²⁰ See Mary Hillebrand, "Titan Halts Decoder Assault." Satellite Business News, Feb. 24, 1993, pp.1, 22,23. See also Letter from Tom Ortolf, President, Titan Satellite Systems Corp. Feb. 18, 1993 ("Ortolf Letter"), attached to "Additional Comments" of Consumer Satellite Coalition (CSC), filed March 10, 1993. (We accept this late filed submission.)

Master's position as a second source licensee for Videocipher modules.²¹ Titan claims that Channel Master is little more than a GIC distributor, receiving completed modules from GIC and performing only minor operations to prepare them for sale. Channel Master asserts that it has always retained discretion under its GIC license to fabricate modules in-house or contract out that work.²² Channel Master implies that the decision on fabrication has been made based on cost factors. We see no reason to doubt Channel Master's assertions. Moreover, we accept Channel Master's representation that it competes with GIC on non-price dimensions such as "shorter lead time and faster warranty repair turn-around time."²³ Nevertheless, we remain convinced, as we were in the Notice, that the scope for competition is limited by the requirement that Channel Master purchase key proprietary chips from GIC regardless of who actually assembles the decoder module.

13. Intersystem competition. Some commenters suggest that the major competitive pressure on C-band decoders will come from completely separate systems.²⁴ These commenters note that PrimeStar, a medium powered Ku band service, uses a Scientific Atlanta system, and that the proposed DirecTV (a Hughes subsidiary) and United States Satellite Broadcasting (a subsidiary of Hubbard Broadcasting) DBS services will use a News Datacom encryption system. Hubbard recently announced agreements to carry HBO, Showtime, and some other Viacom services on its DBS service, while Hughes had earlier secured agreements with the Disney channel and Paramount's pay-per-view arm.²⁵ These developments lend credibility to the idea that DBS will, in fact, offer programming comparable to that available via C-band and hence

popular cable programming is carried).²⁶

14. If one assumes that DBS and C-band services will have similar programming, it appears likely that C-band reception system prices will have to decline, or else consumers would switch from C-band to DBS. In this regard, the figures provided by Consumer Satellite Systems (CSS) on the distributor cost of the components of a C-band satellite reception system are illuminating. CSS uses the wholesale price of a GIC Videocipher module of \$336 and estimates the distributor cost of a complete system at \$866-\$911.²⁷ The module thus represents 37-42 percent of the total cost. CSS further asserts that, since 1986, the cost of another major component of the system--the receiver--has dropped 50 percent. CSS suggests that if GIC would sell module components directly to manufacturers, rather than supplying "a big circuit board in a plastic cage," prices would have been lower and manufacturers would have had the flexibility to build more compact IRDs.²⁸

III. Access to the GIC DBS Authorization Center

15. With virtually no exception²⁹, commenters do not support mandatory access to the GIC DBS Center for Titan or anyone else. GIC suggests that the DBS Center is not an essential facility under antitrust

²⁶ See GIC Comments at 12 for the \$2100 and \$1400 figures. HBO Comments at 4 quotes plans of Hughes and Hubbard to offer DBS reception equipment for \$700 and cites a Satellite Broadcasting and Communications Association estimate of \$2500 as the average price for C-band systems.

²⁷ CSS Comments at 5-9.

²⁸ CSS Reply at 7-8. See also Titan Comments at 20-21 (detailing plans to offer its module without the plastic cage and later to "develop custom packages of security elements" that will permit manufacturers "to design the smart card access and security chip into the IRD as an integral element of the receiver and to remove component redundancy").

²⁹ DECTEC "urges the FCC to encourage General Instrument to relinquish administrative and technical control of the DBS Authorization Center to a neutral and not-for-profit entity." DECTEC Comments at 8. DECTEC later urges mandatory access based on the idea that authorization centers are multichannel video programming distributors under the 1992 Cable Act and subject to program access rules. DECTEC Reply at 2-3. We reject this interpretation. MPAA supports a mandatory access requirement "if such a move is technically feasible." MPAA Comments at 2. Consumer Satellite Coalition favors "eliminating GIC's control of the DBS Authorization Center." CSC Comments at 12. This position appears to stem from CSC's objections to electronic countermeasures ("ECMs") taken by GIC against suspected signal thieves, and CSC's opinion that many ECMs are mistaken.

law, so mandatory access can not be required.³⁰ GIC's legal analysis went unchallenged by other commenters. DECTEC, although it opposes GIC's exclusive control of the DBS Authorization Center, asserts that [A]ccess to GIC's DBS Center is not necessarily critical to enable competition in the supply of compatible HSD decoding equipment. What is crucial is access to programming."³¹ Moreover, various other entities either have or will operate their own authorization centers. Those cited include PrimeStar, Hughes (for DirecTV), Tele-Communications, Inc. (TCI), and News Datacom.³² HBO suggests that "[A]lthough a single DBS Center may foster certain efficiencies, establishing separate centers for separate DBS technologies does not appear to be a barrier to entry for competing encryption systems."³³ GIC estimates the cost of constructing an authorization center at \$500,00-\$2,000,000.³⁴

16. Titan notes that it has constructed its own Titan Authorization Center, lending further support to the idea that lack of access to the GIC center is not a significant barrier to entry. Additionally, Titan concludes that it does not make good business sense to make use of an authorization center controlled by a competitor, although the technical barriers to shared use are small.³⁵ GIC suggests that the technical barriers are, in fact, large and that shared use compounds the security risks.³⁶

17. We do not have the information to evaluate the technical questions regarding shared use of the DBS Center and hence we cannot reach any definitive conclusion regarding the feasibility of authorizing decoder

³⁰ GIC Comments at 26-30.

³¹ DECTEC Reply at 2.

³² See GIC Comments at 27-28, HBO Comments at 19-20, DirecTV Comments at 3-4, News Datacom Comments at 13.

³³ HBO prefaces these remarks with the observation that, "[A]ll things being equal, if there are to be multiple competing scrambling systems, HBO would prefer that they all share a single DBS Authorization Center." HBO Comments at 19 (emphasis added). For other suggestions of cost savings from use of a single authorization center, see Scientific Atlanta Comments at 6 and PrimeTime 24 Comments at 6.

³⁴ GIC Comments at 29.

³⁵ Titan Comments at 36-38. See also PrimeTime 24 Comments at 6.

³⁶ GIC Comments at 19-26, 30; GIC Reply at 11.

modules from rival manufacturers via the GIC DBS Center. However, the question appears to be moot. Titan, the primary prospective entrant, built its own center, indicated that it would not want to use a center owned by a rival³⁷, explicitly stated that it did "not seek Commission-sanctioned access to the General Instrument Center, as we are nearing completion of our own authorization center,"³⁸ and then suspended its own efforts to provide consumer decoders.³⁹ Because of this and what we know about the economics of authorization centers, we find that there is no public policy case for mandating access to the GIC DBS Center.

IV. Other Technological Matters

18. We also received some comments about the standard decoder interface proposal and the transition to digital transmissions. GIC is not particularly enthusiastic about the standard interface, but several other commenters are.⁴⁰ However, interface proponents, including potential rivals to GIC such as News Datacom, generally oppose a government mandated interface standard, preferring that the market resolve this issue. The development of smart card technology makes the standard interface more feasible.

19. The standard decoder interface issue is part of the larger issue of equipment interoperability. Scientific Atlanta (SA) emphasizes the importance of interoperability (calling it "a critical element for future systems") and defines it as "the ability of products and equipment designed and manufactured by one company to operate interchangeably in a system with

³⁷ No commenter has made a convincing case for divesting GIC of the DBS Center. See, however, note 29 above.

³⁸ Titan Reply at 5.

³⁹ See Ortolf Letter.

⁴⁰ GIC Comments at 37; Titan Comments at 38 (endorsing the interface concept without recommending government action); News Datacom Comments at 4-5; News Datacom Reply at 2-3 (endorsing the interface concept but explicitly rejecting government action); CSC Comments at 14-16 (endorsing mandatory interface standard); DECTEC Comments at 5-6 (endorsing mandatory interface standard). See also Satellite Broadcasting and Communications Association (SBCA) Comments at 4-6 (noting the ability of the marketplace to respond to consumer needs in the presence of multiple technologies) and DirectTV Comments at 4 (endorsing current Commission policy of not mandating encryption standards or decoder technologies).

products and equipment designed and manufactured by another company."⁴¹ GIC noted that there are costs as well as benefits of interoperability.⁴²

20. Commenters anticipate a gradual transition from analog to digital transmissions⁴³, characterized by simulcasting of C-band analog signals and digital signals in the C and/or Ku bands, including DBS. Implicit estimates of the remaining availability of C-band transmissions range from nine to 12 years.⁴⁴ Commenters generally believe that programmers will not abandon their C-band customer base. HBO offers a good example of simulcasting, with multiple analog C-band feeds, digital C-band feeds, and plans to offer digital feeds via DBS as well.⁴⁵

21. The transition to digital transmissions is also likely to lead to the development of "hybrid" decoders that can handle analog (likely VCRS) and digital transmissions.⁴⁶ HBO suggests that the pace of the transition from analog to digital will be determined, at least in part, by C-band equipment costs and security.⁴⁷

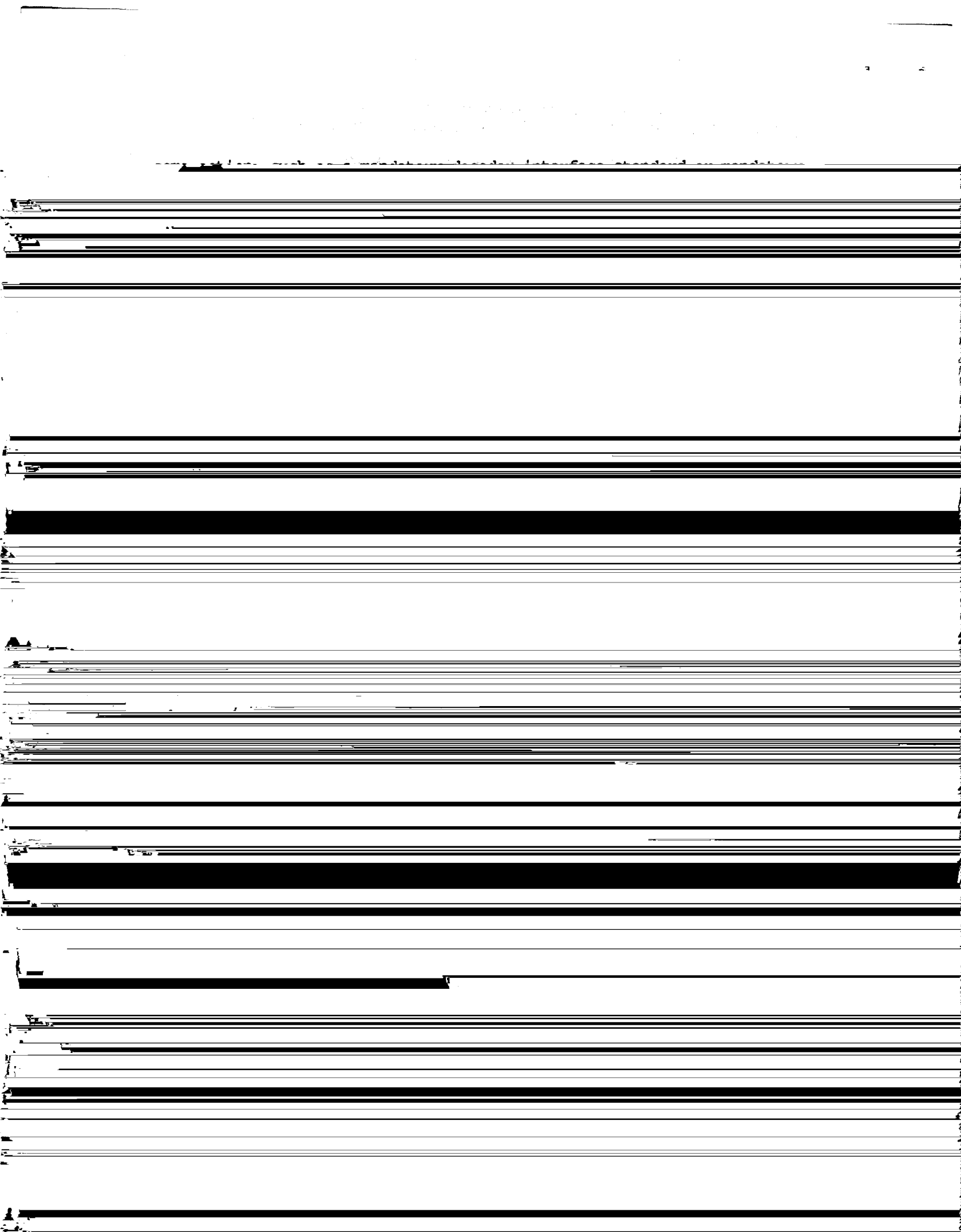
V. Conclusions

22. The major commenters in this proceeding do not ask for any specific Commission or Congressional action. A few commenters recommend

⁴¹ SA Comments at 8.

⁴² GIC Comments at 38-42; GIC Reply at 14-18.

⁴³ HBO and TCI have agreed to use a GIC-AT&T digital compression system for delivery of programming to cable and HSD subscribers. The agreement includes a requirement to license the technology to other manufacturers. Moreover, TCI and GIC will each operate authorization centers to serve programmers that utilize the technology. See Netlink Reply at 3; HBO



Appendix: List of Comments and Reply Comments

Comments

Channel Master
Consumer Satellite Coalition
DECTEC
DirecTv, Inc.
General Instrument Corporation
Home Box Office
Jan Gunter
Lone Star Satellite
Motion Picture Association of America
News Datacom
PrimeTime 24
Satellite Broadcasting and Communications Association
Scientific Atlanta
Thomson Consumer Electronics
Titan Satellite Systems
TV/Com International

Reply Comments

Channel Master
Consumer Satellite Coalition
Consumer Satellite Systems
DECTEC
General Instrument Corporation
Heart of America Independent Satellite Dealers
Home Box Office
Lee Hadlock, Inc.
Netlink
News Datacom
Satellite Broadcasting and Communications Association
Satellite Dealers Association
Titan Satellite Systems